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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/829,010	04/21/2004	Wen-Hsi Lee	9751.105US11	5986

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EXAMINER
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MAYES, MELVIN C

ART UNIT	PAPER NUMBER
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1734

DATE MAILED: 09/12/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/829,010

Applicant(s)

LEE ET AL.

Examiner

Melvin Curtis Mayes

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– The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 10 July 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 17-73 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 17-19, 22-47, 50-66, 69, 72 and 73 is/are rejected.
- 7) ☒ Claim(s) 20, 21, 48, 49, 67, 68, 70 and 71 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

(1)

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

(2)

Claims 17-19, 30-44, 47, 50-66, 69, 72 and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knickerbocker et al. 6,607,620 in view of Flaitz et al. 5,130,067.

Knickerbocker et al. disclose a method of processing greensheets to make a ceramic substrate comprising: providing a laminate (monolithic structure) by providing greensheets 20 having active areas 28 screened and patterned by applying conductive paste into vias and onto the surface to form conductive lines and vias after sintering (active area comprising heterogeneous material pattern of heterogeneous material component), and stacking at least two of the greensheets (dielectric layers and cover layers) with frames 24 such that frames are on the top of the laminate and between greensheets (alternating) to constrain movement including shrinkage of the greensheet within the frame area during stacking and laminating (constraining layer), the frame having openings (windows) of any desired size wherein the edge of an active area of each greensheet is within an opening of the frame; sintering the laminate; and cutting away the frame along cut lines 36 after sintering to produce a plurality of products, the cut lines located between the frame members of the frames and the active areas, the cutting by saw blades or laser cutting. Frames can also be provided to the opposite surfaces of the greensheets. The frames comprise material such as nickel for glass-ceramic greensheets (low-temperature co-fired

ceramics) or ceramics such as glass or other greensheet ceramic materials having higher strength than the greensheet on which the frame is applied, and the frames may be laminated or adhered to the individual green sheets by an adhesive layer. For a greensheet thickness of 0.006 inches and frame thickness of 0.005 inches, when a laminate is made of two greensheets is made, the ratio of the total thickness of the greensheets (dielectric body) to the thickness of a frame on the greensheets is 2.4, less than 3.5 (col. 1-5). Knickerbocker et al. do not disclose reducing shrinkage during sintering of the greensheets by applying Z-direction pressure during firing.

Flaitz et al. teach that X-Y shrinkage is controlled and X-Y distortion and Z-direction camber are eliminated during co-sintering ceramic/metal multilayered ceramic substrate by applying Z-direction force during sintering (col. 4, lines 44-68).

It would have been obvious to one of ordinary skill in the art to have further modified the method of Knickerbocker et al. for making a multilayer ceramic substrate by applying Z-direction force to the glass-ceramic laminate of greensheets and frames during sintering, as taught by Flaitz et al., to control X-Y shrinkage and eliminate X-Y distortion and Z-direction camber. By providing Z-direction force during sintering to control shrinkage, a low-temperature co-fired ceramic having reduced shrinkage is obviously formed.

By providing the frame for glass-ceramic greensheets (low temperature co-fired ceramic) of either nickel, glass or other greensheet ceramic materials having higher strength than the greensheet on which the frame is applied, a constraining layer of a high sintering temperature higher than that of the greensheet (frame of nickel or other greensheet ceramics) or a constraining layer of a low sintering temperature lower than that of the greensheet (frame of glass) is obviously positioned on the greensheets, as nickel or other greensheet ceramic materials

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such as alumina have sintering temperature higher than that of glass-ceramics while glass has sintering temperature lower than that of glass-ceramics.

(3)

Claims 45 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knickerbocker et al. 6,607,620 in view of Flaitz et al. 5,130,067 as applied to claim 17, and further in view of Sakai 6,488,795.

Knickerbocker et al. disclose using an adhesive layer to adhere a frame to each green sheet but do not disclose an adhesive layer of bonding glass.

Sakai teach that metal foils laminated to green sheets suppress shrinkage of the green sheets during firing and teach that glass paste may be coated between the metal foils and green sheets to provide a bond (col. 6, lines 22-25).

It would have been obvious to one of ordinary skill in the art to have modified the method of the references as combined for making a multilayer ceramic substrate by adhering frames of nickel to the glass ceramic greensheets using an adhesive layer of glass paste (bonding glass), as taught by Sakai, as used to provide a bond between metal foil and greensheet. The use of glass paste to provide bonding glass between each nickel frame and greensheet would have been obvious to one of ordinary skill in the art, as suggested by Sakai. The use of a borosilicate glass to adhere the nickel frames would have been obvious to one of ordinary skill in the art as a well known type of glass.

***Allowable Subject Matter***

(4)

Claims 20, 21, 48, 49, 67, 68, 70 and 71 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

(5)

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.


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(6)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melvin Curtis Mayes whose telephone number is 571-272-1234. The examiner can normally be reached on Mon-Fri 7:30 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris Fiorilla can be reached on 571-272-1187. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Melvin Curtis Mayes  
Primary Examiner  
Art Unit 1734

MCM  
September 6, 2006